

## Claims

1. A mask comprising:
  - a thin film;
  - a protective film formed on a part of the thin film;
  - a supporting frame formed on the thin film to surround the protective film; and
  - holes formed in the thin film and the protective film for allowing a charged particle beam or a electromagnetic wave irradiated on the protective film side to pass.
2. A mask as set forth in claim 1, wherein the charged particle beam is an ion beam.
3. A mask as set forth in claim 1, wherein a thickness of the protective film is determined in accordance with accelerating energy of ion implantation in an ion implantation step wherein the mask is used.
4. A mask as set forth in claim 1, wherein a material of the protective film includes a photosensitive resin.
5. A mask comprising:
  - a first thin film;
  - a supporting frame formed on a part of a first surface of the first thin film;

a second thin film formed on a second surface  
of the first thin film; and

holes formed in the first and second thin  
films in a portion surrounded by the supporting frame for  
5 allowing a charged particle beam or a electromagnetic  
wave irradiated on the first surface side to pass;

wherein impurities are introduced into at  
least one of the first thin film and the second thin film  
to control a internal stress thereof.

10 6. A mask as set forth in claim 5, wherein  
the charged particle beam is an ion beam.

7. A mask as set forth in claim 5, wherein  
a thickness of the first thin film is  
determined in accordance with accelerating energy of ion  
implantation in an ion implantation step wherein the mask  
15 is used.

8. A mask as set forth in claim 5, wherein  
a thickness of the second thin film and the  
internal stress are determined in accordance with a size  
20 of a portion surrounded by the supporting frame.

9. A mask as set forth in claim 5, wherein  
the impurities are introduced by an ion  
implantation, and annealing is performed after the ion  
implantation introducing the impurities into at least one  
25 of the first thin film and the second thin film.

10. A method of producing a mask comprising the steps of:

forming a thin film on a substrate via a sacrificial film;

5 forming a supporting frame made by the substrate by removing a part of the substrate until the sacrificial film is exposed;

forming first holes in the thin film in a portion where the supporting frame is not formed;

10 removing the sacrificial film in the portion where the supporting frame is not formed;

forming a protective film on a first surface of the thin film being supporting frame side in the portion where the supporting film is not formed;

15 forming second holes self-aligned to the first holes in the protective film.

11. A method of producing a mask as set forth in claim 10, wherein

the step of forming the protective film 20 includes a step of adhering a photosensitive resin film, and

the step of forming the second holes includes a step of exposing the protective film from a second surface of the thin film via the first holes and a step 25 of developing the protective film thereby an exposed

portion is removed.

12. A method of producing a mask set forth in  
claim 10, wherein

the step of forming the second holes includes  
5 a step of performing an etching on the protective film by  
using the thin film as a mask.

13. A method of producing a mask as set forth in  
claim 10, wherein

the step of removing the sacrificial film in  
10 the portion where the supporting frame is not formed is  
performed after the step of forming the first holes.

14. A method of producing a mask comprising the  
steps of:

forming a first thin film on a substrate via  
15 a sacrificial film;

introducing impurities into the first thin  
film for adjusting an internal stress of the first thin  
film;

20 forming a second thin film on the first thin  
film;

forming a supporting frame made by the  
substrate by removing a part of the substrate until the  
sacrificial film is exposed;

25 forming holes in the first thin film and the  
second thin film in a portion where the supporting frame

is not formed;

removing the sacrificial film in the portion where the supporting frame is not formed.

15. A method of producing a mask as set forth in  
5 claim 14,

further comprising a step of introducing impurities into the second thin film for adjusting an internal stress of the second thin film after the step of forming the second thin film and before the step of  
10 forming the supporting frame.

16. A method of producing a mask as set forth in  
claim 14, wherein

the step of removing the sacrificial film in the portion where the supporting frame is not formed is  
15 performed before the step of forming the holes.

17. A method of producing a mask comprising the steps of:

forming a first thin film on a substrate via a sacrificial film;

20 forming a second thin film on the first thin film;

introducing impurities into the second thin film for adjusting an internal stress of the second thin film;

25 forming a supporting frame made by the

substrate by removing a part of the substrate until the sacrificial film is exposed;

5 forming holes in the first thin film and the second thin film in a portion where the supporting frame is not formed;

removing the sacrificial film in the portion where the supporting frame is not formed.

18. A method of producing a mask as set forth in claim 17, wherein

10 the step of removing the sacrificial film in the portion where the supporting frame is not formed is performed before the step of forming the holes.

19. A method of producing a semiconductor device including a step of performing an ion implantation via a 15 mask on a desired portion of a substrate, wherein

a mask comprising:

a thin film;

a protective film formed on a part of the thin film;

20 a supporting frame formed on the thin film to surround the protective film; and

holes formed in the thin film and the protective film for allowing a charged particle beam or a electromagnetic wave irradiated on the protective film 25 side to pass

is used as the mask.

20. A method of producing a semiconductor device including a step of performing an ion implantation via a mask on a desired portion of a substrate, wherein

5 a mask comprising:

a first thin film;

a supporting frame formed on a part of  
a first surface of the first thin film;

10 a second thin film formed on a second  
surface of the first thin film; and

holes formed in the first and second  
thin films in a portion surrounded by the supporting  
frame for allowing a charged particle beam or a  
electromagnetic wave irradiated on the first surface side  
15 to pass;

wherein impurities are introduced into  
at least one of the first thin film and the second thin  
film to control a internal stress thereof

is used as the mask.